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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the manufacture method of the activated carbon from an inflammable contaminant or a waste solid fuel (RDF).

[0002]

[Description of the Prior Art] The technology which carries out sorting recovery of the inflammable contaminant from domestic wastes (contaminant), reduces and fabricates this conventionally, and is used as a solid fuel is developed plentifully. And this waste solid fuel burns this by the combustion boiler, and is used for power generation etc. Various these inflammable contaminants consist of a miscellaneous thing, and plastics is contained especially in this. Comparatively many vinyl chloride is contained in many cases also in plastics. Since half-melting of the plastics of this vinyl chloride system is carried out by the reduction forming process, although a moldings is obtained, it is convenient. Since a component is **** homogeneity, when this waste solid fuel burns this by the combustion boiler etc., it has the merit that the stable combustion is obtained compared with the case where an inflammable contaminant is burned directly. On the other hand, the plastics of a vinyl chloride system generates a lot of chlorine gas at the time of the combustion, and this chlorine gas will contain it in a combustion gas, and it will be discharged. The combustion gas containing such chlorine gas is usually processed by the exhaust gas processor. That is, slaked lime is supplied, and the uptake of the chlorine gas is neutralized and carried out. Therefore, while a lot of slaked lime is needed, therefore an exhaust gas processor enlarges generating of a lot of chlorine and an installation cost increases, a running cost will increase. Moreover, since piping to a combustion furnace or an exhaust gas processor will be exposed by a lot of chlorine gas, its advance of corrosion is early. Moreover, chlorine gas is a cooling process, and it crystallizes, the accretionary growth is carried out into piping, and a solid is formed, as a result a piping lock out trouble is generated, and it also has re-condensation and the problem of checking stable operation over a long period of time.

[0003]

[Problem(s) to be Solved by the Invention] Recently, although the proposal is made, it has come to be satisfied [with this case] of the method of manufacturing activated carbon from a waste solid fuel enough, in respect of the adsorption capacity force. moreover -- As for activated carbon, what was manufactured from coal, petroleum coke, the petroleum pitch, etc. in mineral systems, such as wood, a saw dust, coconut husks, and peat-moss, by the vegetable system is used as a raw material. It is classified into two, the gas activationsmethode which used gas, such as a steam, and the chemical activation method using the zinc chloride etc., in order to generate the pore structure of activated carbon. It depends for the pore structure of activated carbon on a raw material greatly, and in order to be able to use as activated carbon in which the raw material has the target pore structure, it becomes big examination conditions whether the quality of the raw material, cost, or its raw material can come to hand in large quantities. With the conventional technology, in order that the pore structure of activated carbon may be greatly dependent on a raw material, the raw material of good activated carbon is restricted considerably. moreover -- usually -- the pore structure of activated carbon -- a macropore and meso -- although it can classify into a hole and a micropore -- the pore diameter of a macropore -- pore 500A or more and meso -- so large that a hole is called 500-20A, and the micropore is called pore 20A or less and the specific surface area of activated carbon is a micropore -- it says the case where activated charcoal absorption of the organochlorine compound contained in exhaust gas is carried out -- cyclo -- what has a large specific surface area is said for removal efficiency to be high with the hole The diameter of a particle (molecule) of this compound depends the reason on a small thing. however, cyclo although the dioxin which is the toxic substance which poses a problem recently is based also on a kind, since the particle diameter is large compared with an organochlorine compound -- by the activated carbon of a hole, adsorption is difficult About the activated carbon for dioxin removal, although a pore diameter is larger than usual activated carbon, it turns out that adsorptivity ability has a good direction. However, on the occasion of activated-carbon-izing, heat energy will be needed separately. therefore, an energy expenditure type -- it is -- a manufacturing cost -- high -- an exhaustion of the Tsukuba loan or earth resources, and environmental destruction -- also being connected -- ** -- there is also a problem to say [0004] This invention offers the manufacture method of the activated carbon from a waste solid fuel effective in the adsorption treatment of the dioxin which is especially a toxic substance while receiving activated carbon in large quantities and cheaply by making in order to solve the above problems, and connecting to the cracked gas-ized melting system which uses a waste solid fuel as a raw material.

[0005]

[Means for Solving the Problem] The manufacture method of the activated carbon from the waste solid fuel concerning this

invention is a thing which pyrolyze a waste solid fuel by hot blast at a pyrolysis furnace, considers as carbide, leads this carbide to gas activation equipment, and is depended on a steam and which gas activation is carried out and was made to consider as activated carbon.

[0006] Moreover, pyrolyze a waste solid fuel by hot blast at a pyrolysis furnace, and it considers as carbide. Lead this carbide to gas activation equipment, carry out gas activation with a steam, and it considers as activated carbon. While leading the cracked gas which occurs in process of the carbonization by the pyrolysis of the waste solid fuel in the aforementioned pyrolysis furnace to a melting furnace and burning, fuse the fly ash in this cracked gas, and carry out melting slagging and it collects. While using some steams which led the combustion gas from the aforementioned melting furnace to the waste heat boiler, carried out heat recovery, and were obtained by the aforementioned heat recovery as a steam for the gas activation of the aforementioned gas activation equipment Furthermore, it is leading the aforementioned combustion gas to an exhaust gas processor, and having removed the fly ash and the toxic substance of non-melting in it.

[0007]

[Embodiments of the Invention] Hereafter, the form of implementation of this invention is further explained to a detail based on drawing 1. In drawing 1, 1 is the fluidized-bed pyrolysis (carbonization) furnace which pyrolyzes a waste solid fuel, and can use a rotary kiln etc. other than a fluidized bed. The pure gas (air) which the fluidized-bed pyrolysis furnace 1 mentions later while the hot blast by which the air from the combustion-air fan 5 was heated at the steamy heater 6, and was heated is supplied is supplied as an object for fluidization. A waste solid fuel is thrown into the fluidized-bed pyrolysis furnace 1 through a hopper 2, the conveyance conveyer 3, and the constant feeding machine 4. Moreover, a waste solid fuel is carbonized by the pyrolysis under hypoxia atmosphere, being heated by the hot blast heated at the combustion-air fan 5 and the steamy heater 6, while being fluidized by the pure gas from the pure gas circulation fan 21 mentioned later.

[0008] As for the screw feeder for discharge of carbide, and 8, 7 is [sorting machines, such as a vibration screen, and 9] carbide storage hoppers. A sorting machine 8 is perforated-plate form, the thing on this perforated plate is accumulated in the carbide storage hopper 9, and the bed material under this perforated plate flows back to the fluidized-bed pyrolysis furnace 1. 10 is gas activation equipment, 11 is the melting furnace of cracked gas, and the hot blast heated at the fuel for melting and the steamy heater 6 is supplied. The exhaust heat boiler which 12 generates the water granulation pit of a molten slag by the aforementioned exhaust gas, and 13 makes generate a steam, and 14 are exhaust gas processors, and a steam turbine and 15 are constituted by exhaust gas ***** 16, a bag filter 17, activated-charcoal-absorption equipment 18, and the slaked-lime feeder 19. The pure gas circulation fan by whom the invitation fan of pure gas and 21 supply a part of pure gas to a chimney, and, as for 22, 20 supplies it to the fluidized-bed pyrolysis furnace 1, and 23 are melting fly ash Bangka.

[0009] A waste solid fuel is thrown into the fluidized-bed pyrolysis furnace 1. Here, a waste solid fuel is pyrolyzed and carbonized by direct heating by the hot blast from the hypoxia atmosphere and the steamy heater 6 in the fluidized-bed pyrolysis furnace 1. Cracked gas occurs in process of the carbonization by the pyrolysis of the aforementioned waste solid fuel. The aforementioned cracked gas is gas of a hydrocarbon system, and a part for chlorine (chlorine gas, a hydrogen chloride, and chloride) is included further. The aforementioned cracked gas is led to a melting furnace 11 with fly ash, and the inflammable gas in cracked gas (hydrocarbon system gas) is burned here under the elevated-temperature atmosphere by supply of fuel and supply of the hot blast heated at the steamy heater 6. Thereby, the fly ash in cracked gas carries out melting slagging, and these molten slags are collected from the water granulation pit 12. The collected molten slag is used effectively for the cement aggregate, a tile, subgrade material, etc. On the other hand, after supplying a waste heat boiler 13 and generating a steam, the combustion gas of a melting furnace 11 is led to the exhaust gas processor 15, and is processed. That is, a steam is supplied to a power plant 14, generates power, or remains as it is and is used for heating.

[0010] The combustion gas from which the fly ash from a melting furnace 11 was removed The uptake of the fly ash of non-melting is carried out. it leads to a bag filter 17 after a temperature fall by exhaust gas ***** 16 -- having -- the part in it -- Furthermore, a part for chlorine is neutralized by the slaked lime supplied from the slaked-lime addition machine 19, a uptake is carried out, and it is further led to activated-charcoal-absorption equipment 18, and the adsorption treatment of the dioxin which is a toxic substance is carried out, and pure gas is attracted by the invitation fan 20, and is emitted to the atmosphere through a chimney 21. Here, a part of pure gas is supplied to the fluidized-bed pyrolysis furnace 1 by the pure gas circulation fan 22, and it is used as an object for fluidization of a waste solid fuel. In addition, as for the dust containing the neutralized chlorination calcium by which the uptake was carried out with the bag filter 17, proper (harmless-izing) processing of cement solidification, the chelate processing, etc. is carried out by the conventional method.

[0011] On the other hand, the carbide (fixed char) carbonized by the pyrolysis at the fluidized-bed pyrolysis furnace 1 is sent to a sorting machine 8 by the screw feeder 7 for discharge, and can be collected in the carbide storage hopper 9 through a perforated-plate top. In addition, the bed material under a perforated plate is returned to the fluidized-bed pyrolysis furnace 1. Subsequently, gas activation equipment 10 is filled up with the carbide from the carbide storage hopper 9, and it is activated-carbon-ized by the gas activation using the steam here. The steam in this case supplies the steam from a waste heat boiler 13. Moreover, on the occasion of gas activation, in order to maintain the temperature in gas activation equipment 10 to an elevated temperature (600 degrees C - 1000 degrees C), it becomes hot outside. Outside [this] heat is heated by the electric heater (illustration abbreviation) prepared in the exterior of gas activation equipment 10. An electric heater uses the power from a power plant 14.

[0012]

[Example] Gas activation processing of the carbide which uses a waste solid fuel as a raw material was carried out with the steam, and activated carbon was manufactured. Temperature is 850 degrees C and the activation conditions in this case

performed activation of 5 hours with the steam by nitrogen-gas-atmosphere method. Moreover, the amount of supply of a steam was made into 0.240 g/hr. the meso according the activated carbon manufactured with the above to the DORIMOA heel method -- the pore-radius distribution map of a hole is shown in drawing 2, and the pore-radius distribution map of the micropore according the same activated carbon to the MP method (abbreviated name) is shown in drawing 3. It is the rate [pore radius] in which a horizontal axis exists and pore exists [a vertical axis] in drawing 2 and 3. Moreover, specific surface area is 416.2m²/g, when a BET adsorption method is applied. the activated carbon manufactured as mentioned above is shown in drawing 2 -- as -- meso -- by becoming the large thing of the pore radius from which the hole developed, and using this for activated-charcoal-absorption equipment 18 showed demonstrating an effect extremely to adsorption of dioxin. In addition, this activated carbon cannot be overemphasized by being used effectively as other deodorization or adsorption material.

[0013]

[Effect of the Invention] This invention does so the shell constituted as mentioned above and an effect which is described below. According to the claim 1, a waste solid fuel is pyrolyzed by hot blast at a pyrolysis furnace, and it considers as carbide, and this carbide can be led to gas activation equipment, and the waste solid fuel by the steam positioned as waste since gas activation is carried out and it was made to consider as activated carbon can be used effectively as adsorption material only as fuel. And since it manufactures using a waste solid fuel, this activated carbon can be manufactured very cheaply compared with conventional activated carbon. Therefore, if this activated carbon is used for an adsorber, adsorption-treatment cost can be reduced. Moreover, since a waste solid fuel is used as a start raw material, the stable pyrolysis can become possible, and good (purity is high) carbide can be obtained to high yield, as a result activated carbon can be produced in large quantities. furthermore, the activated carbon manufactured from the waste solid fuel -- meso -- the large thing of the pore radius from which the hole developed can be obtained. Consequently, it will become very useful at adsorption treatments, such as dioxin.

[0014] According to the claim 2, pyrolyze a waste solid fuel by hot blast at a pyrolysis furnace, and it considers as carbide. Lead this carbide to gas activation equipment, carry out gas activation with a steam, and it considers as activated carbon. While leading the cracked gas which occurs in process of the carbonization by the pyrolysis of the waste solid fuel in the aforementioned pyrolysis furnace to a melting furnace and burning, fuse the fly ash in this cracked gas, and carry out melting slagging and it collects. While using some steams which led the combustion gas from the aforementioned melting furnace to the waste heat boiler, carried out heat recovery, and were obtained by the aforementioned heat recovery as a steam for the gas activation of the aforementioned gas activation equipment. Furthermore, since the aforementioned combustion gas is led to an exhaust gas processor and the fly ash and the toxic substance of non-melting in it were removed pass carbide (fixed char) from a waste solid fuel -- since activated carbon is manufactured and fly ash can be used as a molten slag, it is effective as material recycling and a deployment becomes possible also in energy by using cracked gas for gas activation further. And discharge to the atmosphere of the toxic substance contained in the cracked gas which occurs in process of manufacture of activated carbon is also avoided, and there is also no fear of environmental pollution.

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CLAIMS

[Claim(s)]

[Claim 1] The manufacture method of the activated carbon from the waste solid fuel which pyrolyzes a waste solid fuel by hot blast at a pyrolysis furnace, considers as carbide, and is characterized by the thing which lead this carbide to gas activation equipment, and is depended on a steam, and which gas activation is carried out and was made to consider as activated carbon.

[Claim 2] Pyrolyze a waste solid fuel by hot blast at a pyrolysis furnace, consider as carbide, lead this carbide to gas activation equipment, carry out gas activation with a steam, and it considers as activated carbon. While leading the cracked gas which occurs in process of the carbonization by the pyrolysis of the waste solid fuel in the aforementioned pyrolysis furnace to a melting furnace and burning, fuse the fly ash in this cracked gas, and carry out melting slagging and it collects. While using some steams which led the combustion gas from the aforementioned melting furnace to the waste heat boiler, carried out heat recovery, and were obtained by the aforementioned heat recovery as a steam for the gas activation of the aforementioned gas activation equipment The manufacture method of the activated carbon from the waste solid fuel characterized by leading the aforementioned combustion gas to an exhaust gas processor, and removing the fly ash and the toxic substance of non-melting in it.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the refuse-disposal method and its equipment.

[0002]

[Description of the Prior Art] Conventionally, a contaminant is processed through spallation, dryness, and a judgment process as technology of processing a municipal solid waste, and there is the refuse-disposal method which fabricates a solid fuel. Usually at such a dryness process of down stream processing, lamp oil was used. Moreover, as for the solid fuel which did in this way and was manufactured from the contaminant, the technology in which some odors remain and add lime to a solid fuel for deodorization and an antiseptis is known. However, a lot of lime is required in this case, and there is a problem that ash content increases.

[0003] Moreover, there is a garbage disposal equipment equipped with spallation of a municipal solid waste, dryness, judgment, and solid-fuel fabrication equipment as equipment which processes the above-mentioned municipal solid waste. Activated carbon deodorization equipment is usually attached to such equipment in many cases.

[0004]

[Problem(s) to be Solved by the Invention] The after heat which this invention has the problem which requires processing of the ashes produced from a solid fuel in this case for the purpose of cutting down use of lamp oil at a dryness process in the above-mentioned municipal-solid-waste processing using the solid fuel generated, and an ashy disposal place is needed, and ashes have makes it a technical problem to solve the problem that it does not contribute to dryness of a contaminant.

[0005]

[Means for Solving the Problem] In the method of having been made in order that this invention might solve the above-mentioned trouble, crushing and drying it, classifying it, fabricating a municipal solid waste, and manufacturing a solid fuel While carbonizing this, generating carbide and carbonization gas using some manufactured aforementioned solid fuels and using carbonization gas for the aforementioned dryness process, it is the manufacture method of the solid fuel characterized by adding in the forming raw material of a solid-fuel forming cycle by making carbide into deodorization / antiseptis material.

[0006] At this time, it is good also as performing activity Chinese poem-ization to some or all of the aforementioned carbide, and using for them the carbide formed into the activity Chinese poem as activated carbon of activated carbon deodorization equipment. The equipment of this invention which can enforce the above-mentioned this invention method suitably In the garbage disposal equipment equipped with spallation of a municipal solid waste, dryness, judgment, and solid-fuel fabrication equipment The solid-fuel carbonization furnace which the equipment and this solid fuel which extract and send out some aforementioned solid fuels are carbonized [furnace], and generates carbide and carbonization gas, It is the garbage disposal equipment characterized by having addition equipment which adds the carbonization gas guidance duct which guides carbonization gas to a dryer, and carbide in the forming raw material of a solid-fuel forming cycle. In addition, it is desirable when attached in the activity Chinese poem-ized equipment which gives activity to the aforementioned carbide.

[0007] The equipment of this invention which can enforce the above-mentioned this invention method suitably In unsettled equipment equipped with spallation of a municipal solid waste, dryness, judgment, and solid-fuel fabrication equipment It is characterized by having addition equipment which adds the carbonization gas guidance duct which guides the solid-fuel carbonization furnace which the equipment and this solid fuel which extract and send out some aforementioned solid fuels are carbonized [furnace], and generates carbide and carbonization gas, and carbonization gas to a dryer, and this carbide in the forming raw material of a solid-fuel forming cycle. Furthermore, it is attached in the activity Chinese poem-ized equipment which gives activity to the aforementioned carbide, and if it has deodorization equipment which uses this, use of a suitable solid fuel and use to deodorization can be performed.

[0008]

[Function] By the refuse-disposal method of this invention, since the solid fuel manufactured by the refuse disposal is used for the dryness process of a contaminant, the amount of the lamp oil used is reducible. Carry out to not burning this solid fuel and making it carbonize, and it is made to produce carbonization gas and carbide, and is made not to produce ashes in this invention in use of the solid fuel manufactured by the refuse disposal. Hot carbide is mixed in the raw material of the forming cycle of a solid fuel, using carbonization gas as a heat source of a dryness process. Therefore, it is unnecessary to process the generated ashes.

[0009] By mixing in the raw material of the forming cycle of a solid fuel the hot carbide generated at the carbonization process,

the heat can be used effective in dryness. Since 300 degrees C of temperature are near at moisture zero, if it adds to a making machine small quantity every and is made for a carbonized part not to light it, the dryness at the time of fabrication will be urged to it, and it will reduce the load of a drying furnace. For example, if 23% of a generating solid fuel is carbonized, since carbide can be taken 30% among those, it becomes possible to add a total of 7% of carbide. This carbide has deodorization and the antiseptis effect. By using this deodorization and the antiseptis effect, deodorization and an antiseptis of a solid fuel are promoted and preservation of a solid fuel becomes easy.

[0010] An ash handling system can be unified to the treatment facility of the ashes when burning a solid fuel by carbonizing and adding to a solid fuel, although ashes are generated and processing of ashes is needed, when a solid fuel is only used for the dryness process of a contaminant as fuel. It is possible to perform activity Chinese poem-ization to some or all of the aforementioned carbide, and to give the same property as activated carbon. This carbide formed into the activity Chinese poem can be used as activated carbon of activated carbon deodorization equipment.

[0011] A solid-fuel carbonization furnace restricts air supply, the partial combustion of the solid fuel is carried out, and it heats it, generates carbonization gas, and makes carbide generate. This furnace is good also as a successive-reaction furnace, and may use the reactor of a batch type. When using the reactor of a batch type, it is desirable to operate two or more reactors one by one. Moreover, as activity Chinese poem-ized equipment which gives activity to this carbide, continuation or the steam reactor of a batch type is used.

[0012]

[Example] The block diagram and drawing 3 which show the array of equipment which uses drawing 1 for the refuse disposal of the example of this invention are the flow sheet. It is supplied to a shredding equipment 3 with injection equipment 2 from an acceptance hopper, dry with a dryer 4, and a municipal solid waste 1 has the organic substance, a metal, glass, etc. classified by judgment equipment 5, and is crushed with the secondary shredding equipment 18. The classified combustible is supplied to forming equipment 6 as a raw material of a solid fuel, is fabricated here, serves as a solid fuel 8 through weighing capacity equipment 7, and is shipped by truck 9 grade.

[0013] In the conventional equipment of a more than, in the example of this invention, some solid fuels 8 are isolated preparatively, it feeds into the newly formed solid-fuel carbonization furnace 10, and it is carbonized. Drawing of longitudinal section of an example of this carbonization furnace 10 was shown in drawing 4. The carbonization furnace 10 equipped the carbonization furnace main part 22 of a double-pipe rotary-kiln formula with the hopper 21 which supplies a solid fuel 20, the exhaust port 23 which discharges the carbonized solid fuel (carbide 12), and the exhaust port 24 of carbonization gas 11, and is equipped with the hot blast producer 25 which heats the carbonization furnace main part 22, the jacket 26, and the hot blast gas exhaust port 27. in the ends of the carbonization furnace main part 22, the attachment **** seal is carried out, and hoods 28 and 29 support on the carrier roller which is not illustrated, and rotate with the slewing gear which is not illustrated. If the carbonized solid fuel (carbide 12) is mixed with the mixed screw 14 of drawing 3 by porosity and is mixed with a contaminant with the mixed hopper 17, it will deodorize by adsorbing the odor particle of a contaminant, and after heat will contribute to dryness of a raw material.

[0014] As the carbonization gas 11 which occurred at the carbonization furnace 10 is shown in drawing 3, it uses as an auxiliary heat source of a dryer 4, and it is mixed into the forming raw material of a solid fuel, and carbide 12 is supplied to forming equipment 6. The sensible heat which carbide 12 holds is used for heating of a forming raw material. It is as follows when an example of the material balance in the flow of drawing 1 is raised. When the 200kg contaminant 1 is thrown in, the forming raw material discharged from judgment equipment 5 is set to about 100kg. It will be set to 110kg if 10kg of carbide 12 is mixed as a forming raw material. 70% is shipped, 30% is isolated preparatively and a solid fuel 8 is supplied to the solid-fuel carbonization furnace 10. The carbide 12 discharged from the carbonization furnace 10 is set to 10kg at about 30%.

[0015] Drawing 2 is a flow sheet which shows the array of the garbage disposal equipment of another example. In drawing 2, reference numbers 1-12 are the same as drawing 1. In drawing 2, some carbide 12 generated from the carbonization furnace 10 is sent to activity Chinese poem-ized equipment 15, and activity is Chinese-poem-ized. The activated carbon which Chinese-poem-ized activity is used for deodorization equipment 16 grade. Steaming performed activity Chinese poem-ization of carbide 12. The example of the property after the formation of an activity Chinese poem was hung up over Table 1.

[0016]

[Table 1]

炭化物の成分（活性賦化後）

水分	0.9%
C	42%
S	0.33%
Cl	0.46%
H	0.1%以下
N	0.28%
比表面積	663 m ² / g
発熱量	3380 kcal / kg

[0017]

[Effect of the Invention] By the refuse-disposal method of this invention, since the solid fuel manufactured by the refuse disposal

is used for the dryness process of a contaminant, the amount of the lamp oil used is reducible. Since it is made to carbonize in using this solid fuel, without producing ashes, processing of the ashes in the institution of a solid fuel is unnecessary. Moreover, by mixing hot carbide in the raw material of the forming cycle of a solid fuel, heat can be used effective in dryness. Deodorization and an antiseptis of a solid fuel are promoted by deodorization and the antiseptis effect of this carbide, and preservation of a solid fuel becomes easy. Moreover, an ash handling system can be unified to the treatment facility of the ashes when burning a solid fuel by carbonizing and adding to a solid fuel, although ashes are generated and processing of ashes is needed, when a solid fuel is only used for the dryness process of a contaminant.

[Translation done.]